

Claim 1, 2 and 4 are pending, and these have been finally rejected on both formal and prior art grounds.

Formal Grounds

The specification has been objected to under 35 USC 132 because "or irregular" on page 3, line 19 introduces "new matter into the disclosure of the invention." This objection is repeated as a rejection of claims 1, 2 and 4 under 35 USC 112, first paragraph because claim 1 recited "non-regular".

This objection and rejection are respectfully traversed.

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b

The metallic foils according to the present invention serve as current collectors in, for example, a lithium secondary battery or a lithium-ion battery. The foil desirably has holes (penetrating holes) which penetrate the foil. The hole can have a smooth surface defining its perimeter or it can have a surface which is not smooth. The term used to describe the "not smooth" surface was originally "complicated." This term was found by the examiner to be objectionable because "[c]omplicated generally means difficult and it is unclear what a complicated or difficult shape encompasses." (Page 4, of the Office Action of October 7, 1999.). To overcome the objection, "complicated" was modified in the specification to "complicated or irregular," and to "non-regular" in claim 1. These modifications, it was believed, would clarify any confusion, which apparently it did not. Still, the condition of "irregular" or "non-regular" is, it is respectfully submitted, clearly shown in Figs 1 and 2, even if it is found nowhere else.

The examiner in the latest Office Action takes the position that "or irregular" in the specification is objectionable, and "non-regular" in claim 1 is rejectable. This leaves applicant with no place to go, except back to "complicated," since, presumably, the illustration in Figs 1 and

2 is not supportive, which in fact they are.

Also, the term "complicated" means more than that which the examiner expresses as her understanding. The term "complicated" could mean "difficult" as suggested by the examiner, and such a meaning would not lend much to and understanding of the surface under consideration. However, "complicated" also means "having many interconnected parts," or "marked by an interrelation of diverse and often numerous parts..." (Webster's Third New International Dictionary, page 465, copy enclosed). Considering these definitions, lends more meaning to the concept of the shape of the surface defining the holes. Couple this with Figs. 1 and 2 and, it is respectfully submitted, no confusion should exist.

It is respectfully submitted, therefore, that the term "complicated" should be accepted if "irregular" is not. In either case, those skilled in the art should have no difficulty in understanding what is intended.

Claim 4 has been rejected as indefinite under 35 USC 112, second paragraph, because it is incomplete since "essential steps" have been omitted according to the examiner. This rejection is respectfully traversed.

To understand claim 4, reference is made to Japanese patent 3-13926. A copy of this patent and an English language abstract are being submitted herewith. Note Fig. 2 of this patent which shows the roll 3 penetrating the foil 1 to form holes. The roll 3 corresponds to a concavo-convex roll like that used in the present invention. All that is needed is rotation if the roll is configured as a concave-convex roller.

As to what a "given pressure" is, it is a pressure sufficient to produce a hole. Still, as suggested by the examiner, claim 4 has been amended to change "under a given pressure" to

"under pressure."

Prior Art Grounds

Claims 1, 2 and 4 have been finally rejected as unpatentable 35 USC 103(a) over Jenkins et al. This rejection is respectfully traversed.

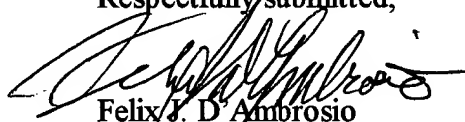
Full { Claim 1 defines a current collector with very specific parameters, namely, two equations which must be satisfied to define the surface shape of the penetrating holes. If these equations are not disclosed in Jenkins et al, it is not seen how Jenkins et al can render claim 1 unpatentable. Jenkins et al has no reason to even contemplate the noted equations, because their holes do not have a complicated or irregular shape. Nor is it proper to suggest that Jenkins et al would contemplate the two equations because they are made with a punch die and not a concavo-convex roller.

A reference which teaches a plate with punched holes is not sufficient, it is respectfully submitted, to render a foil with a plurality of penetrating holes satisfying two specific equations, obvious.

Regarding claim 4, it is the convex parts that create the penetrating holes, and the penetrating holes are those defined in claim 1. Claim 4 is therefore a product-by-process claim and as such enjoys the distinctions noted above relative to claim 1. Jenkins et al cannot render claim 4 unpatentable in the same way that it cannot render claim 1 unpatentable. Also, Jenkins et al does not teach the step of passing the metal foil with the penetrating holes formed therein "further through between a pair of metal smoothing rolls" for the purpose of de-burring the penetrating holes at their periphery.

In view of the foregoing, reconsideration and re-examination are respectfully requested and claims 1, 2 and 4 found allowable.

Respectfully submitted,



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complemented past of COMPLEMENT
complement fixation *n*: the absorption of complement to the compound formed by the union of an antibody and the antigen for which it is specific occurring when complement is added to a mixture (in proper proportion) of such an antibody and antigen

complement-fixation test *n*: a test for the presence of a particular antibody made by addition of complement and an indicator system to a mixture of known antigen and a serum suspected to contain the specific antibody for this antigen and used esp. in the diagnosis of syphilis — see WASSERMANN TEST

complementing pres part of COMPLEMENT

complements *pl* of COMPLEMENT, *pres 3d sing of COMPLEMENT*

com-plete \kəm'plēt, usu -ēd + V\ *adj*, often -ēd -ēst [ME *complet*, fr. MF, fr. L *completus*, past part. of *compleo* to fill up, fr. *com-* + *plere* to fill, akin to *plenus* full — more at FULL] **1 a**: possessing all necessary parts, items, components, or elements: not lacking anything necessary: ENTIRE, PERFECT (few households would regard breakfast without a plate of porridge — L.D. Stamp) (this man ... with wings and four stripes on his uniform sleeve — E.K. Gann) (neither one of these publications gives the poems of Smart — A.R. Benham)

b: having all four sets of floral organs — compare INCOMPLETE, MONOCLINOUS **c** (1) of a subject or predicate: including modifiers, complements, or objects if any (in the sentence "the little boy hit the ball hard" the little boy is the subject and hit the ball hard is the predicate) — compare SIMPLE (2) of a verb: filling out a predication without any object or complement (moved in "the train moved" is a verb) **d** of a diet or ration: BALANCED **2**: brought to an end or to a final or intended condition (a period of time) (a act): CONCLUDED, COMPLETED (all necessary, usual, or typical qualities, habits, or accomplishments (a man) (a gentleman) (a Englishman): SPECIFIC: highly proficient (as in an art or skill) (a landscape artist) (a horseman) **4**: fully realized: carried to the ultimate: THOROUGH, TOTAL (in sympathy with his views) (surrender) (his inability to understand)

2 complete \vī -ēd -īng -s **1**: to bring to an end often into or as if into a finished or perfected state (foolish to put his hand to a task which he could not — John Buchan); SPECIFIC: to execute (a forward pass) successfully (State completed 10 of 19 passes while Rutgers made good 4 of 10 — N.Y. Times) **2 a**: to make whole, entire, or perfect: end after satisfying all demands or requirements (art partly ~s what nature is herself sometimes unable to bring to perfection — Havelock Ellis) **b**: to mark the end of: show attainment to the total or totality of (small mammals, birds, and tropical fish ... the zoo exhibits — Amer. Guide Series: N.Y. City) **c**: ACCOMPLISH, EXECUTE, FULFILL (a contract) (a vow completed) **d**: CONSUMMATE (allowed the lovers to ~ their marriage — G.M. Trevelyan) SYN see CLOSE

com-plet-ed-ness *n*: COMPLETENESS

complete fertilizer *n*: a fertilizer that contains the three primary plant nutrients (nitrogen, phosphoric acid, and potash)

complete integral *n*: a solution of a partial differential equation of the first order that contains as many arbitrary constants as there are independent variables

com-plete-ly *adv* **1**: so as to be complete: FULLY (a furnished apartment) **2**: to a complete degree: ENTIRELY (the horse rolled ~ over) (at fault)

com-plete-ment \t'mənt *n*: COMPLETION (together we have all the elements of ~ — Betty Smith)

com-plete-ness \t'nəs *n*: **1**: the quality or state of being complete **2** of an axiomatized system of logic: the state of being so constituted that a contradiction arises through the addition of any formula not previously deducible from the axioms of the system

complete pair *n*: CLOSED PAIR

complete primitive *n*: the complete integral regarded as the basis of the differential equation

complete quadrilateral *n*: a figure that is determined by four coplanar lines, and has four sides and three diagonal axes, each two of which cut the other harmonically in three centers of which one or even two may be at infinity

complete solution *n*: GENERAL SOLUTION

complete stop *n*: a set of organ pipes extending throughout the compass of the manual

com-ple-tion \kəm'plēshən *n*: **1**: [L *completio*, *completio* filling, fr. *completus* (past part. of *compleo* to complete) + *-io*, *-io* -ion — more at COMPLETE] **2**: the act or action of completing, becoming complete, or making complete (his ~ of the late artist's unfinished masterpiece): SPECIFIC: a forward pass caught by the receiver (out of 10 attempted passes, there were 5 ~s) **3**: the quality or state of being complete: FULFILLMENT (his desires having reached ~)

completion test *n*: an intelligence test requiring that the one to be tested complete a whole (as a sentence or picture) from which certain parts have been omitted

com-ple-tive \kəm'plēvī *adj* [LL *completivus*, fr. L *completus* + *-ivus* -ive] **1**: serving or tending to complete (annotations ~ of the text): SPECIFIC: of a verbal aspect: expressing completion of an action — **com-ple-tive-ly** \d-əvīvī *adv*

com-ple-to-ry \d-ə-rē *n*: **1**: [ME *completorie*, fr. LL *completorium*, fr. L *completus* + *-orium*] COMPLINE

completory \kəm'plē-tō-ri *adj* [completo + -ory]: COMPLETIVE

com-plex \kəm'plēks, kəm'p- *vi* -ēd -īng -s [L *complexus*, past part. of *complecti* 1: to make complex or into a complex (a ~ing problem) 2: CHELATE

2 complex \kəm'plēks *adj*, sometimes -ēd -ēst [L *complexus*, past part. of *complecti* to intertwine around, embrace, fr. *com-* + *plectere* to braid — more at PLY] **1 a**: composed of two or more separable or analyzable parts, constituents, or symbols: COMPOSITE: opposed to simple (the sign "2 x 5 = 10" — A.J. Ayer) (the sea is a ~ mixture of chemicals — W.H. Daws) **b** (1) of a word: having a bound form as one or both of its immediate constituents (unmanly is a ~ word) — contrasted with compound, simple (2) of a sentence: consisting of a main clause and one or more subordinate clauses (make hay while the sun shines is a ~ sentence) — contrasted with compound, simple **2 a**: having many varied interrelated parts, patterns, or elements and consequently hard to understand fully (a ~ camera with many attachments) (a ~ industrial process) (a ~ tissue) **b**: marked by an intricate involvement of many parts, aspects, details, notions, and necessitating earnest study or examination to understand (the ~ of the universe) (an extremely ~ industrial and commercial enterprise far removed from the simplicities of farming — Amer. Guide Series: Calif.) (movements as vast and ~ as the migration of peoples — Lewis Mumford) (a ~ mass of diverse laws and customs, written and unwritten — H.O. Taylor) **3**: formed by union of simpler substances (as compounds or ions) — used of salts, ions, and other chemical combinations (a ~ protein)

SYN COMPLICATED, INTRICATE, KNOTTY, INVOLVED: COMPLEX stresses the fact of combining or folding together various parts and suggests that considerable study, knowledge, or experience is needed for comprehension or operation (all legal definitions are highly ~ complex — C. Ogden & I.A. Richards) (the ~ details of naval, ground, and air activities — F.D. Roosevelt) (a ~ apparatus of washers, scales, slicers, diffusion tanks, purifiers, filter presses, evaporators, vacuum pans, centrifugal machines, and driers — Amer. Guide Series: Calif.)

the logician, the psychologist, and the critical philosopher to clear up for us — Edward Sapir) (your question ... is a knotty one, and such as, had I the wisdom of Solomon, I should be puzzled to answer — William Cowper) INVOLVED indicates an intertwining such that some parts return or seem to return upon themselves, as in certain difficult knots, making unraveling or understanding very hard (public issues are so large and so involved that it is only a few who can hope to have any adequate comprehension of them — C.L. Dickinson)

3 complex \kəm'plēks *also* \kəm'plēks *adj*, sometimes -ēd -ēst [L *complexus* surrounding, embrace, fr. *com-* + *plectere* to braid — more at PLY] **1**: an association of related things often in intricate combination: as **a**: a group of culture traits relating to a single activity (as hunting, maize growing, pottery making), process (as the use of flint, construction of megalithic monuments), or unit of culture (as Folsom, neo-Eskimo) — an aggregate of artifacts — called also *culture complex*, *trait-complex* **b** [G *Komplex*, fr. L *complexus*]: a system of repressed or suppressed desires and memories that exerts a dominating influence upon the personality; broadly: exaggerated reaction (as of fear or sensitiveness) to some subject or situation (she has always had a ~ about bugs) **c**: a group of obviously related units (as of species) of which the degree and nature of the relationship is imperfectly known **d** (1): a haploid chromosome set containing a specified set of genes arranged in a particular order (2): a group of chromosomes that always pass together in meiosis to one daughter cell — compare GAMETE **e**: a group of kinds of organisms (as clones, strains, or varieties) showing common adaptation of a particular kind, usu. to a specialized environment **2**: a conjunction of varied contributing or interacting factors, elements, or qualities: as **a**: a complex substance (as a coordination compound, an ion containing several atoms, or an adsorption compound) (molecular ~es) (enzyme-substrate ~) — usu. distinguished from mixture **b**: an assemblage of different rocks having structural relations intricately involved (the Archaean ~) **c**: a complex of word — contrasted with compound, simplex **3**: the sum of factors (as symptoms and lesions) characteristic of a disease (syndrome) (primary ~ tuberculosis) — SYN see SYSTEM

complexed \kəm'plēksəd *adj*, -ks (t)nəs *n*: **1**: COMPLEXITY

complexer comparative of COMPLEX

complexes pres 3d sing of COMPLEX, pl of COMPLEX

complex superlative of COMPLEX

complex fraction *n*: a fraction having a fraction or mixed number in the numerator or denominator or in each — called also *compound fraction*

complex function *n*: a function of the complex variable

complex idea *n*: an idea formed by the mind out of simple ideas known by sensation and reflection

com-plex-i-ty \kəm'plēks-i-tē *n*: **1**: the sum of the sum of factors (as symptoms and lesions) characteristic of a disease (syndrome) (primary ~ tuberculosis) — SYN see SYSTEM

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J P 3 - 1 3 9 2 6

TITLE: Manufacture of perforated metal plate

ABSTRACT: To obtain a perforated metal plate without generating a material loss by making a hole by a roll having a lot of projection, turning back its return by a scratching jig, and thereafter, executing a rolling by a roll.

As for a perforating roll 3, a projection 2 is provided in a line in the circumferential direction and the width direction,

A metal plate 1 is fed continuously between the roll 3 and a receiving roll 11. A hole 4 is made by the projection 2, and a return 6 is cut and raised. The metal plate 1 is fed continuously and the return 6 hits against the tip of a scratching jig 5. The return 6 is turned back, and thereafter, rolled by a rolling roll 7. The metal plate 1 is rolled thinly and elongated, and also the return 6 is allowed to gnaw as one body with the metal plate 1, and a perforated metal plate having no burr is obtained. Since there is no punching dust, no material loss is caused, and no burr is generated, therefore, this metal plate can be handled easily.

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⑮ 発明の名称 孔明き金属板の製造方法

審判 昭62-7741

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⑰ 公開 昭60-133936

⑱ 出願 昭58(1983)12月23日

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㉔ 参考文献 実公 昭42-15992 (J P, Y 1)

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㉕ 特許請求の範囲

1 金属板を連続的に送って多数の突起を有する孔明けローラにて孔を明け、次いで引つかき治具にて孔を明けた返りを折り返し、次いで圧延ローラにて圧延して返りを金属板に食い込ませて全面に亘って均一な厚さにすることを特徴とする孔明き金属板の製造方法。

発明の詳細な説明

〔産業上の利用分野〕

本発明は金属板の全面に多数の孔が明いた孔明き金属板を連続的に製造するのに用いる技術に関するものである。

〔従来の技術〕

従来、金属板の全面に多数の孔を明ける場合、プレス等による打ち抜きによって行っていたが、打ち抜き屑が出て打ち抜き屑の分だけ材料ロスとなり、また打ち抜いたときばりができるという欠点があった。

〔発明が解決しようとする課題〕

本発明は叙述の点に鑑みてなされたものであつて、本発明の目的とするところは材料ロスなく確実に孔を明けることができると共にばりが出ない孔明き金属板の製造方法を提供するにある。

〔課題を解決するために手段〕

本発明孔明き金属板の製造方法は、金属板 1 を

連続的に送って多数の突起 2 を有する孔明けローラ 3 にて孔 4 を明け、次いで引つかき治具 5 にて孔 4 を明けた返り 6 を折り返し、次いで圧延ローラ 7 にて圧延して返り 6 を金属板 1 に食い込ませて全面に亘って均一な厚さにすることを特徴とする。

〔作用〕

金属板 1 に孔 4 を明けるとき本来打ち抜き屑となる部分を返り 6 として形成し、この返り 6 を孔 4 以外の部分に折り返して返り 6 を圧延にて金属板 1 に食い込ませることができて、打ち抜き屑をなくして材料ロスなく孔明き金属板 8 ができる。

〔実施例〕

3 は孔明けローラであつて、外周に多数の鋸歯状の突起 2 を周方向及び幅方向に列設してある。つまり第 1 図に示すように外周に鋸歯状の突起 2 を周方向に全周に亘って設けたものを幅方向に適当な間隔を隔てて複数列設けてある。この孔明けローラ 3 の上方には孔明けローラ 3 と平行にゴムローラのような受けローラ 11 を配置してあり、孔明けローラ 3 と受けローラ 11 を転接させてある。孔明けローラ 3 及び受けローラ 11 の両端の軸は夫々軸受け板 12 に回転自在に支持してある。この受けローラ 11 の前方 (金属板 1 の進行方向を前とする) には引つかき治具 5 を配設して

あり、この引つかき治具5は断面変形状に形成され下端が鋭角に尖っている。引つかき治具5の下方には金属板1の板厚の隙間を介して受け台13を配置してあり、受け台13の両端を引つかき治具5の両端を連結板14にて連結してある。この引つかき治具13の前方には一對の圧延ローラ7を上下に配置してあり、圧延ローラ7の両端の軸を軸受け板15に回転自在に支持してある。

孔明き金属板8を製造するにあたっては、孔明けローラ3の手前から鋼板、アルミニウム板、銅板等の金属板1を連続的に送り、金属板1を孔明けローラ3と受けローラ11との間に供給する。すると回転する孔明けローラ3と受けローラ11との間で第2図に示すように突起2にて金属板1の長手方向及び幅方向に多数の孔4が明けられると共に各孔4に孔4を明けたための返り6が第3図に示すように形成される。金属板1に孔4を明けるとき金属板1が第4図に示すように孔明けローラ3と受けローラ11との間を通過し、孔明けローラ3の突起2に対応する部分だけ受けローラ11が弾性的に凹んでスムーズに孔4が明けられると共に返り6が形成される。孔4を明けた金属板1はそのまま連続的に送られて引つかき治具13と受け台13との間に供給され、引つかき治具5の下端である先端に返り6が当たって第5図に示すように返り6が折り返される。次いでこの金属板1が一對の圧延ローラ7間に供給されて圧延される。すると、第6図に示すように金属板1が薄く圧延されて伸びると共に返り6が金属板1に一体に食い込みばりのない孔明き金属板8が形成される。この孔明き金属板8は全体が帯板状であり、全面に亘って上下に貫通した孔4が形成されており、例えば第7図に示すような樹脂被覆金属板9の芯材として用いられる。樹脂被覆金属板9を形成する場合、押し出し成形機等で孔明き金属板8の両面の全面に亘ってポリ塩化ビニルのような合成樹脂10が被覆される。この樹脂被覆金属

板9を形成したとき両面の合成樹脂10が孔明き金属板1の孔4を介して一体につながり、両面の合成樹脂10が孔明き金属板8の両面に強固に密着し、合成樹脂10が剥離しない樹脂被覆金属板9が得られる。このようにして形成された樹脂被覆金属板9は帯板状である。この樹脂被覆金属板9は適当な長さに切断して建築板として用いたり、また樋状の折り曲げ加工して雨樋として用いたり、その他の種々の用途に用いたりできる。

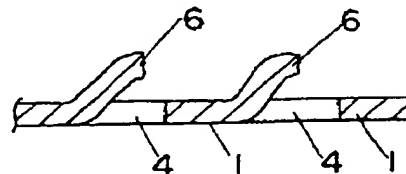
[発明の効果]

本発明は叙述の如く金属板に孔明けローラにて孔を明け、引つかき治具にて孔を明けた返りを折り返し、圧延ローラにて圧延して返りを金属板に食い込ませて全面に亘って均一な厚さにするので、確実に孔が明くのは勿論、孔明けにより生じた返りを金属板に食い込ませてこの返りの材料分だけ余分に金属板を展延できるものであつて、打ち抜き屑が出ず返りを有効利用して材料ロスをなくすることができるものであり、しかもばりが出ず次工程での取り扱いがしやすいものであり、さらに圧延するとき孔により伸びのばらつきをなおして均一に圧延できるものである。

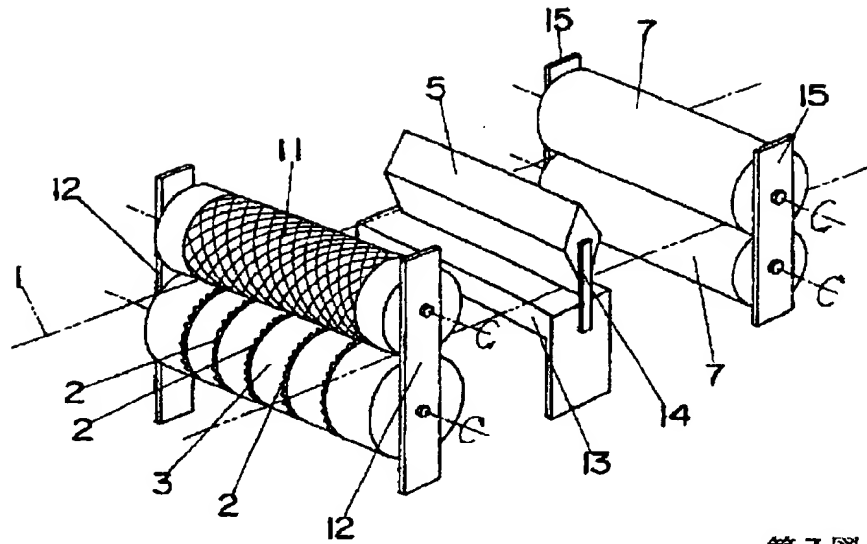
図面の簡単な説明

第1図は本発明方法を実施する装置の斜視図、第2図は同上の金属板に孔明けローラにて孔を明ける状態を示す断面図、第3図は同上の孔明けローラにて孔を明けた状態の断面図、第4図は孔を明けたときの孔明けローラと受けローラの状態を説明する断面図、第5図aは同上の返りを折り返す状態と圧延状態を示す断面図、第5図bは返りの折り返し状態の断面図、第6図は同上により得られた孔明き金属板を示す断面図、第7図は同上の孔明き金属板に合成樹脂を被覆した状態の断面図であつて、1は金属板、2は突起、3は孔明けローラ、4は孔、5は引つかき治具、6は返り、7は圧延ローラである。

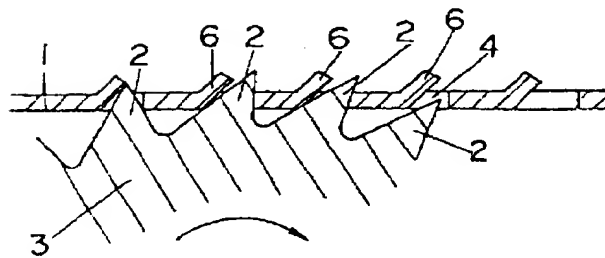
第3図



第1図

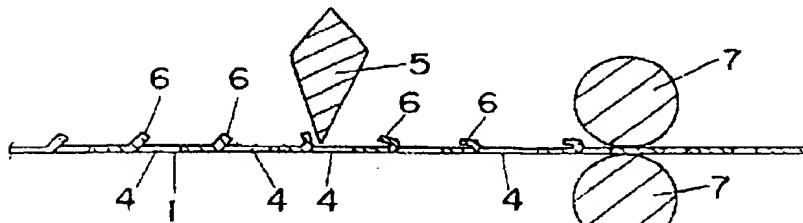


第2図

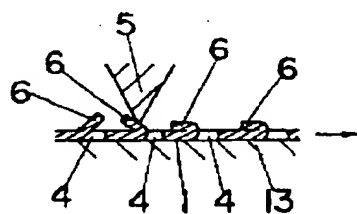


第5図

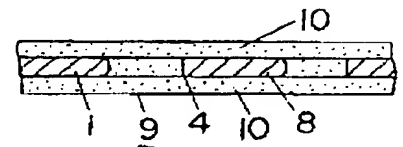
(a)



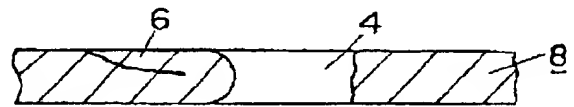
(b)



第7図



第6図



第4図

